Asiatic Centella

BOTANY

*Centella asiatica* (L.) Urban belongs to the Umbelliferae family and it is commonly known as asiatic centella.

Asiatic centella is a tender creeping plant with numerous creeping stems which have roots at the nodes and are glabrous. The circular-reniform leaves are 2 to 6 cm long and 1.5 to 5 cm wide, with a crenate margin and 5 to 9 ribs. The petioles are 3 to 30 cm long. The pedicles are 1.2 to 4 cm long. The sepals of the epicalyx are oval to circular, with a membranous border and are about 2.5 to 3 mm long and 1.5 to 2.5 mm wide. The umbels have 2 or 3 sessile or short pedicled florets. The petals are white, to purple or pink. The calyx is not generally dentate. The fruit is oval to globose and has a diameter of 2 to 5 mm. The mericarps are clearly flattened at the sides and usually have 7 to 9 ribs and are raised rugose. The plant is indigenous to Southeast Asia, India, Sri Lanka, parts of China, western South sea Islands, Madagascar, South Africa, southeast U.S., Mexico, Venezuela, Colombia, and eastern South America.

Asiatic centella extract is obtained from the leaves of *Centella asiatica* (L.) Urban.

CHEMISTRY

**Triterpene saponins**

1-8%.

The mainly triterpene saponins are asiaticoside and madecassoside. There are other saponins present but in a minority percentage (centelloside, brahmoside, brahminoside and B, C and D centellasaponins).

**Triterpene genins**

Asiatic acid, madecassic acid and madasiatic acid.

**Essential oil**

0.1%.

- Monoterpenes: α-pinene, β-pinene, myrcene, γ-terpinene, borneol, bornyl acetate
- Sesquiterpenes: α-copanene, β-elemene, β-caryophyllene, trans-β-farnesene, germacrene, bicycloelemene

**Flavonoids**

Isoquercitrin and astragalin.

**Phytosterols**

β-sitosterol, stigmasterol, campesterol.
**Sugars**
Rhamnose, arabinose, fructosa, sucrose, raffinose.

**Other active principles**
Tannins (20-25%), bitter principle (vallerin), aminoacids (lisien, alanine, phenylalanine, serine, aspartic and glutamic acid), fatty acids (palmitic, oleic, linoleic acid), resin, pectin, alkaloids (traces) and mineral salts.

**TRADITIONAL USES**

Legend goes that the tigers used to rub themselves with the Tiger’s herb (Centella plant), in order to heal their scars. Perhaps the legend is not without truth, nowadays the selected triterpenes of Centella asiatica is the principle active in a range of specialties for the management of dermatological conditions including post operative scarring.

The use of Centella asiatica in the management of dermatological conditions has a long tradition in its native areas, such as India and Sri Lanka, where it is used to support faster healing of small wounds, chaps and scratches, surgical wounds, superficial burns and varicose ulcers and as an oral preparation for atonic wounds and hypertrophic healing. Centella has also been used traditionally as an antiinflammatory, particularly for eczema, and also for minor itching and insect bites.

**COSMETIC PROPERTIES**

**Collagen synthesis stimulating activity**
The active ingredients of the selected triterpenes of Centella asiatica have shown to have modulating properties on the development and metabolism of connective tissue.

*Centella asiatica* has been documented to aid wound healing in several scientific studies. One of the primary mechanisms of action of this plant appears to be the stimulation of type-1 collagen production. Animal studies have consistently shown topical application of *Centella asiatica* to a sutured wound significantly increased the breaking strength of the wound. Asiaticoside, a saponin extracted from *Centella asiatica*, is thought to be one of its active constituents. It was showed that a 0.2% asiaticoside solution applied topically twice daily for seven days to punch wounds in guinea pigs resulted in 56% increase in hydroxyproline, 57% increase in tensile strength, increased collagen content, and better epithelialization compared to control (MacKay, D. & Miller, A.L., 2003).

Thus, selected triterpenes of *Centella asiatica* may help to improve wound repair with a better re-epithelialisation and a normalisation of perivascular connective tissue allowing an improvement of the venous wall tone and elasticity.

**Activity on vascular tone**
Most clinical studies of *Centella asiatica* used either undefined alcohol or aqueous extracts or one of the following extracts: TECA; TTFCA; or TTF. The extracts TECA (titrated extract of *Centella asiatica*) and TTFCA (total triterpenoid fraction of *Centella asiatica*) are combinations comprised of asiatic acid (30%), madecassic acid (30%), and asiaticoside (40%). The Centella extract TTF (total triterpenic fraction) is
comprised of asiatic acid and madecassic acid (60%) in a riot not clearly defined, in combination with asiaticoside (40%).

Rigorous clinical investigation of Centella asiatica has been conducted on chronic venous insufficiency and varicose veins. Centella has the potential to enhance connective tissue integrity, elevate antioxidant levels in wound healing, and improve capillary permeability. A randomized, multicenter, placebo-controlled, double-blind study investigated Centella extract in the treatment of venous insufficiency. Ninety-four patients received either TECA in to different doses (120 mg/day; 60 mg/day) or placebo over a two-month period. Results were evaluated subjectively by the patients’ symptoms and objectively by plethysmography. The TECA groups resulted in significant improvements (p<0.05) in symptoms of heaviness in the lower limbs, edema, and overall evaluation by the patient. Venous distensability, measured by a mercury strain gauge plethysmograph at three occlusion pressures, was improved for the TECA groups but aggravated for the placebo group. The differences in the effect of the different TECA doses were not significant, but did reveal a dose-effect relationship.

Mucopolysaccharides are one of the main components of the amorphous cellular matrix (ground substance) that maintains vascular integrity. The biochemical action of Centella extract was shown to reduce serum levels of lysosomal enzymes involved in the degradation of mucopolysaccharides. The TTFCA extract was administered (30mg three times daily) to 20 patients with severe varicose veins in the leg over an observation period of three months. Prior to the treatment, elevated baseline serum lysosomal enzymes were established (β-glucuronidase 1.8 +/- 0.4 μM/min/L, β-N-acetylglucosaminidase 23.1 +/- 0.4 μM/min/L, and arylsulfatase 0.078 +/- 0.003 μM/min/L) indicating an increased mucopolysaccharide turnover in subjects with varicose veins. During the treatment period these levels fell progressively. At the end of the three-month trial there was a significant reduction in the serum levels of the lysosomal enzymes (β-glucuronidase 1.2 +/- 0.05 μM/min/L, β-N-acetylglucosaminidase 17.7 +/- 0.7 μM/min/L, arylsulfatase 0.042 +/- 0.003 μM/min/L). These reductions were interpreted as evidence of a positive effect of the TTFCA extract on the pathogenesis of varicose veins.

In another double-blind, placebo-controlled study the effects of Centella extract on capillary filtration rate was investigated. Centella asiatica (TTFCA) extract was administrated to 62 patients at two different doses (90 mg/day; 180 mg/day). Capillary filtration rate was evaluated in comparison to placebo. At the end of the four-week treatment period there was a dose-dependent reduction in capillary filtration rate measured by plethysmography. In comparison with the placebo group, the dose-dependent improvements seen in the TTFCA group were significant. The reduced capillary filtration rate was associated with improvement in microcirculation and in clinical symptoms. In addition, local application of TTFCA extract has been shown to improve vascular tone. In a double-blind study involving 80 patients, Centella extract was applied locally three times daily to patients with various venous disorders (including hemorrhoids and varicose veins). Patients, physicians, and ultrasonic examination noted subjective and objective improvements in symptoms (MacKay, D., 2001).

Therefore, Asiatic centella extract is recommendable to formulate cosmetic products with vessel-protection, venotonics and anti-cellulite activities.

Antioxidant activity
Oral treatment with 50 mg/kg/day of crude methanol extract of Centella asiatica for 14 days significantly increased the anti-oxidant enzymes, like superoxide dismutase (SOD), catalase and glutathione.
peroxidase (GSHPx), and anti-oxidants like glutathione (GSH) and ascorbic acid decreased in lymphoma-bearing mice (Jayashree, G. et al., 2003).

An aqueous extract of *Centella asiatica* at 200 & 300 mg/kg for 21 days was effective in preventing the cognitive deficits, as well as the oxidative stress, caused by Intracerebroventricular streptozotocin in rats (Veerendra Kumar, M.H., 2003).

Thus, Asiatic centella extract is recommendable to formulate cosmetic products for the protection of skin and hair against oxidative processes.

Finally, we had to mention the reference publication *Plants in cosmetics. Vol.I* (Council of Europe, 1994), which includes a monograph on the *Centella asiatica* selected triterpenes and on the *Centella asiatica* glycolic extract, which mentions the following cosmetic effects and maximum recommended concentrations:

- smoothing, soothing, purifying
  up to 0.5% selected triterpenes
  up to 5% glycolic extract
  in emulsion for wrinkled, chapped, reddish skins. Aftersun products. Lotions, gels and creams for body massage. Toothpastes and mouth washes for atonic gums.
- other possible effects: granulation promoting agents, anti-irritant, anti-edema, antiseptic

### COSMETIC APPLICATIONS

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### RECOMMENDED DOSE

The recommended dose is between 0.5% and 5.0%.

### BIBLIOGRAPHY

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